

## AMENDMENTS TO THE CLAIMS

Kindly amend claims **12**, **27**, and **29** as shown in the listing of claims below. This listing of claims will replace all prior versions, and listings of claims in the application.

- 1 1-11. (canceled)
- 1 12. (currently amended) An inorganic/organic nanolaminate barrier film, comprising:
  - 2 a plurality of layers of an inorganic material; and
  - 3 a plurality of layers each consisting of an organic polymer wherein the layers of organic
  - 4 polymer alternate with the layers of inorganic material;
  - 5 wherein adjacent layers of the organic polymer **material** and **the** inorganic material are
  - 6 covalently bonded layers characterized by covalent bonds that couple adjacent layers
  - 7 together.
- 1 13. (previously presented) The barrier film of claim 12 wherein the total number of layers of
- 2 organic polymer and layers of inorganic material in the film is between about 100 and
- 3 about 1000 layers, or between about 1000 and about 10,000 layers, or between about
- 4 10,000 layers and about 100,000 layers.
- 1 14. (original) The barrier film of claim 12 wherein each of the layers of inorganic material has a
- 2 thickness of about 0.1 nm to about 1 nm; about 1 to about 10 nm; or about 1 nm to about
- 3 100 nm.
- 1 15. (original) The barrier film of claim 14 wherein the barrier film is substantially transparent.
- 1 16. (original) The barrier film of claim 12 wherein the barrier film has a permeability to oxygen
- 2 less than about 1 cc/m<sup>2</sup>/day, 0.1 cc/m<sup>2</sup>/day, 0.01 cc/m<sup>2</sup>/day, 10<sup>-3</sup> cc/m<sup>2</sup>/day, 10<sup>-4</sup>
- 3 cc/m<sup>2</sup>/day, 10<sup>-5</sup> cc/m<sup>2</sup>/day, or 10<sup>-6</sup> cc/m<sup>2</sup>/day.
- 1 17. (original) The barrier film of claim 16 wherein the barrier film has a permeability to water
- 2 vapor less than about 1 g/m<sup>2</sup>/day, 0.1 g/m<sup>2</sup>/day, 0.01 g/m<sup>2</sup>/day, 10<sup>-3</sup> g/m<sup>2</sup>/day, 10<sup>-4</sup>
- 3 g/m<sup>2</sup>/day, 10<sup>-5</sup> g/m<sup>2</sup>/day, or 10<sup>-6</sup> g/m<sup>2</sup>/day.
- 1 18. (previously presented) The barrier film of claim 12 wherein one or more of the layers of
- 2 organic polymer is a superhydrophobic layer.

- 1        19. (original) The barrier film of claim 18 wherein the superhydrophobic layer includes  
2              fluororalkylsilane.
- 1        20. (previously presented) The barrier film of claim 12 wherein the layers of organic polymer are  
2              made from polymer precursors to which one or more one or more hydrophobic groups  
3              have been added.
- 1        21. (original) The barrier film of claim 20 wherein the one or more hydrophobic groups are  
2              selected from the group of non-polar hydrophobic groups, methyl groups, benzyl  
3              (aromatic) groups,  $\text{PO}_4^{3-}$ ,  $\text{SO}_4^{2-}$ ,  $\text{CH}_3\text{COO}^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{NO}_3^-$ ,  $\text{ClO}_4^-$ ,  $\text{I}^-$ ,  $\text{SC}_n^-$  anions,  $\text{NH}_4^+$ ,  
4               $\text{Rb}^+$ ,  $\text{K}^+$ ,  $\text{Na}^+$ ,  $\text{Cs}^+$ ,  $\text{Li}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Ba}^{2+}$  cations, tryptophan, isoleucine, phenylalanine,  
5              tyrosine, leucine, valine, methionine, and alanine.
- 1        22. (original) The barrier film of claim 12 wherein the barrier film is made from a sol including  
2              one or more Gemini surfactants.
- 1        23. (original) An article of manufacture, comprising:  
2              an object having a surface; and  
3              an inorganic/organic hybrid nanolaminate barrier film of the type set forth in claim 12  
4              disposed on the surface.
- 1        24. (original) The article of manufacture of claim 23 wherein the object is selected from the  
2              group of optoelectronic devices, LEDs, solar cells, FETs, lasers, pharmaceutical products,  
3              tablets in packages, medical devices, food products, packaged foods, beverages, candies,  
4              display screens, touch panel displays, flat panel displays, electroluminescent windows,  
5              windows, transparent films and coatings, electronic components, and chassis for appliances  
6              used in rugged environments.
- 1        25. (previously presented) The barrier film of claim 12 wherein one or more of the layers of  
2              organic polymer and/or inorganic material are in the form of lamellae.
- 1        26. (previously presented) The barrier film of claim 12 wherein one or more of the layers of  
2              organic polymer and/or inorganic material are in the form of tubules.
- 1        27. (currently amended) The barrier film of claim 12 wherein the organic polymer **material** is  
2              chosen from the group of polyethylene naphthalate, polyether etherketone, polyether sulfone,

3 polymers formed from fluorinated or non-fluorinated styrene polymer precursors, fluorinated  
4 or non-fluorinated methyl styrene polymer precursors, fluorinated or non-fluorinated  
5 (meth)acrylate polymer precursors, and combinations and/or derivatives of two or more of  
6 these precursors.

1 28. (previously presented) The barrier film of claim 12 wherein adjacent layers of the organic  
2 polymer and inorganic material are covalently bonded to each other at an interface between  
3 organic and inorganic materials.

1 29. (currently amended) The barrier film of claim 12 wherein the layers of the organic polymer  
2 **material** are discrete layers of organic polymer and wherein the layers of inorganic material  
3 are discrete layers of inorganic material.

1 30. (previously presented) The barrier film of claim 12 wherein alternating layers of organic  
2 polymer and inorganic material present a long and tortuous penetration path through the  
3 barrier film to an underlying substrate.

1 31. (previously presented) The barrier film of claim 12 wherein layers of the inorganic material  
2 are self-assembled layers of inorganic material.

1 32. (previously presented) The barrier film of claim 12 wherein layers of the organic polymer are  
2 self-assembled layers of organic polymer.

1 33. (previously presented) The barrier film of claim 12 wherein at least one coating of material  
2 self-assembles into the alternating plurality of layers of inorganic material and plurality of  
3 layers of organic polymer.

1 34. (previously presented) The barrier film of claim 12 wherein layers consisting of the organic  
2 polymer and layers of the inorganic material have different material compositions.

1 35. (previously presented) The barrier film of claim 12 wherein the layers of inorganic material  
2 are layers consisting of the inorganic material.